



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 13, 2014

Mr. Lawrence J. Weber
Senior Vice President and
Chief Nuclear Officer
Indiana Michigan Power Company
Nuclear Generation Group
One Cook Place
Bridgman, MI 49106

SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2 - REPORT FOR THE AUDIT REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES AND RELIABLE SPENT FUEL POOL INSTRUMENTATION RELATED TO ORDERS EA-12-049 AND EA-12-051 (TAC NOS. MF0766, MF0767, MF0761, AND MF0762)

Dear Mr. Weber:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 27, 2013 (ADAMS Accession No. ML13101A381), Indiana Michigan Power Company (the licensee) submitted its OIP for Donald C. Cook Nuclear Plant, Units 1 and 2 (CNP) in response to Order EA-12-049. By letters dated August 26, 2013, and February 27, 2014 (ADAMS Accession Nos. ML13240A308 and ML14063A042, respectively), the licensee submitted its first two six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the CNP interim staff evaluation (ISE) and audit report on January 24, 2014 (ADAMS Accession No. ML13337A325), and continues with in-office and onsite portions of this audit.

By letter dated February 27, 2013 (ADAMS Accession No. ML13071A323), the licensee submitted its OIP for CNP in response to Order EA-12-051. By letter dated June 19, 2013 (ADAMS Accession No. ML13164A381), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 11, 2013, August 26, 2013, and February 27, 2014 (ADAMS Accession Nos. ML13196A250, ML13247A050, and ML14063A041, respectively), the licensee submitted its RAI responses and first two six-month updates to the OIP.

The NRC staff's review to date led to the issuance of the CNP ISE and RAI dated November 13, 2013 (ADAMS Accession No. ML13310B499). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111 as discussed above. By letter dated April 28, 2014 (ADAMS Accession No. ML14115A315), the NRC staff issued an audit plan to the licensee for an audit of vendor information pertaining to Order EA-12-051.

The ongoing audits allow the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and staff potential concerns.

In support of the ongoing audit of the licensee's OIPs as supplemented, the NRC staff conducted an onsite audit at CNP from June 17-19, 2014 per the audit plan dated May 21, 2014 (ADAMS Accession No. ML14140A064). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

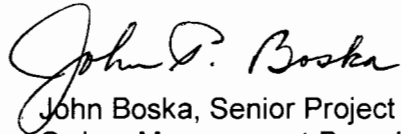
The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open audit items currently under NRC staff review.

L. Weber

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If you have any questions, please contact me at 301-415-2901 or by e-mail at John.Boska@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "John D. Boska". The signature is written in a cursive style with a large, looping initial "J".

John Boska, Senior Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket Nos.: 50-315 and 50-316

Enclosure:
Audit report

cc w/encl: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO ORDERS EA-12-049 AND EA-12-051 MODIFYING LICENSES
WITH REGARD TO REQUIREMENTS FOR
MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS
AND RELIABLE SPENT FUEL POOL INSTRUMENTATION
INDIANA MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 50-315 and 50-316

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). Order EA-12-049 directs licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE). Order EA-12-051 requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a BDBEE. The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 27, 2013 (ADAMS Accession No. ML13101A381), Indiana Michigan Power Company (the licensee) submitted its OIP for Donald C. Cook Nuclear Plant, Units 1 and 2 (DC Cook or CNP) in response to Order EA-12-049. By letters dated August 26, 2013, and February 27, 2014 (ADAMS Accession Nos. ML13240A308 and ML14063A042, respectively), the licensee submitted its first two six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in

Enclosure

accordance with NRC Office of Nuclear Reactor Regulation (NRR) Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the CNP interim staff evaluation (ISE) and audit report on January 24, 2014 (ADAMS Accession No. ML13337A325), and continues with in-office and onsite portions of this audit.

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In support of the ongoing audit of the licensee's OIPs as supplemented, the NRC staff conducted an onsite audit at CNP from June 17-19, 2014 per the audit plan dated May 21, 2014 (ADAMS Accession No. ML14140A064). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

Following the licensee's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented; the resulting site-specific OPDs/FIPs; and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the staff will make a safety determination using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" issued in August 2012 (ADAMS Accession No. ML12242A378), as endorsed by NRC interim staff guidance (ISG) JLD-ISG-2012-01 "Compliance with Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events'" (ADAMS Accession No. ML12229A174). For Order EA-12-051, the staff will make a safety determination using the NEI developed guidance document NEI 12-02, Revision

1, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC ISG JLD-ISG-2012-03 "Compliance with Order EA-12-051, 'Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12221A339) as providing one acceptable means of meeting the order requirements. Should the licensee propose an alternative strategy for compliance, additional staff review will be required to evaluate the alternative strategy in reference to the applicable order.

AUDIT ACTIVITIES

The onsite audit was conducted at the CNP facility from June 17, 2014, through June 19, 2014. The NRC audit team staff was as follows:

Title	Team Member	Organization
Team Lead	Stephen Vaughn	NRR/DIRS
Branch Chief	Stewart Bailey	NRR/MSD
Technical Support – Electrical	Kerby Scales	NRR/MSD
Technical Support – Reactor Systems	Joshua Miller	NRR/MSD
Technical Support – Balance of Plant	On Yee	NRR/MSD
Technical Support – I&C	Stephen Wyman	NRR/MSD
Project Manager	John Boska	NRR/MSD

The NRC staff executed the onsite portion of the audit per the three part approach discussed in the May 21, 2014, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies compliance program, a review of specific technical review items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFP equipment.

AUDIT SUMMARY

1.0 Entrance Meeting (June 17, 2014)

At the audit entrance meeting, the NRC staff audit team introduced itself followed by introductions from the licensee's staff. The NRC audit team provided a brief overview of the audit's objectives and anticipated schedule.

2.0 Integrated Mitigating Strategies Compliance Program Overview

Per the audit plan and as an introduction to the site's program, the licensee provided a presentation to the NRC audit team titled "DC Cook FLEX Overview." The licensee reviewed its strategy to maintain core cooling, containment, and SFP cooling in the event of a BDBEE, and the plant modifications being done in order to implement the strategies. Also reviewed was the design and location of the FLEX equipment storage facility, the FLEX equipment that would be stored there, the interface with the Regional Response Center, and the spent fuel pool level indication modification.

3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff technical reviewers conducted interviews with licensee technical staff, site walk-downs, and detailed document review for the items listed in the plan. Results of these technical reviews and any additional review items needed from the licensee are documented in the audit item status table in Attachment 3, as discussed in the Conclusion section below.

3.1 Reactor Systems Technical Discussions and Walk-Downs

NRC staff met with licensee staff to discuss the timing of the injection of borated water into the reactor coolant system, and the mixing of that water during natural circulation conditions. NRC staff determined that the timing of the injection would allow sufficient mixing time.

3.2 Electrical Technical Discussions and Walk-Downs

a. NRC staff reviewed the calculations on extending battery life based on load shedding, and walked down the battery rooms to evaluate strategies for hydrogen and temperature control. Also walked down panels used for load shedding to evaluate feasibility and timing.

b. NRC staff walked down FLEX electrical equipment which was already on site. The staff noted a concern that the phase rotation of the three-phase FLEX generators may not match the phase rotation of the site. The licensee committed to check phase rotation before their order compliance date, and ensure that the color coded phase wires would match the plant configuration. The staff reviewed the licensee's load and sizing calculations for the FLEX generators. No concerns were identified.

3.3 SFPI Technical Discussions and Walk-Downs

NRC staff walked down the location of the SFPI sensors in the SFP room, and the locations of the readouts and the batteries in the back aisle off the control rooms. NRC staff also reviewed the routing of the cables. No concerns were identified during the walkdown. NRC staff also reviewed the steam venting plan for the SFP room.

3.4 Other Technical Discussion Areas and Walk-Downs

a. NRC staff met with licensee staff to discuss the required robust source of water for the turbine-driven auxiliary feedwater (TDAFW) pumps. The condensate storage tanks (CSTs) were previously noted to be susceptible to tornado-borne missiles. The licensee is performing analyses to credit the survival of the lower two-thirds of the CSTs (that area is somewhat thicker than the upper third). The staff walked down the physical location of the CSTs and the suction line to the TDAFW pumps, and will review the final analyses. Either CST can feed both units TDAFW pump after locally opening the cross connect valve in the turbine building.

b. NRC staff discussed temperature limits for certain critical pieces of equipment, such as the TDAFW pumps and the FLEX boric acid injection pumps. The staff walked down the TDAFW pump room, and reviewed the licensee's alternate ventilation plans. The staff walked down the location for the electric-driven FLEX boric acid injection pumps in the auxiliary building and noted that the area was relatively open and not susceptible to quick increases in temperature. No concerns were identified during the walkdown.

c. NRC staff walked down the new FLEX Storage Building (FSB), Staging Area B, and the Staging Areas A. Construction of the FSB was almost complete. Staff identified a concern that the equipment haul path from Staging Area B to the plant had not been evaluated to be feasible following a seismic event, particularly the consideration of soil liquefaction. Staging Area C is the South Bend airport, about 25 miles from the plant by road.

d. NRC staff reviewed the licensee's flooding evaluation of a seiche from Lake Michigan, and walked down the seawall barrier. No concerns were identified during the walkdown.

e. Lake Michigan is the credited source of water for the steam generators (SGs) after the CSTs are empty, although water may be available from the municipal water supply or from the fire pump test header. NRC staff walked down all three sources. The water from Lake Michigan is pumped (using a FLEX pump) from the intake tunnel (forebay area) near the turbine building. The NRC staff expressed a concern that the pump suction needed to lift water about 20 feet in order to achieve flow. The licensee committed to performing a test, and on July 29, 2014, reported that the test was successful.

f. NRC staff walked down the FLEX strategies for core cooling, RCS inventory, and SFP inventory functions. This included the point of deployment for the portable FLEX pumps, hose routing and deployment connection points (primary and alternate). No concerns other than those stated elsewhere in this section were identified.

g. NRC staff walked down the access points to the safety-related fuel oil storage tanks (FOSTs), which will be the source of the diesel fuel used to refuel the FLEX equipment. The access points are accessible considering the current flooding licensing basis, but should be reevaluated when the flooding reanalysis is completed. Staff walked down the refueling paths to be used by the refueling trailer.

h. The boric acid storage tanks (BASTs) are located in the auxiliary building and are credited by the licensee to supply the borated water needed for RCS injection to prevent recriticality after the cooldown and xenon decay. NRC staff walked down the BASTs to verify that they are not susceptible to boron precipitation due to cold temperatures during an ELAP.

i. The licensee's cooldown strategy relies on local operation of the SG power-operated relief valves (PORVs). The NRC staff walked down the actions for local operation in the Unit 1 east and west steam stop enclosures (Unit 2 is similar). The staff noted that it is

necessary to climb ladders and climb over safety railing in order to locally operate the PORVs. The licensee stated that operators are currently trained to do this in accordance with fire response procedures. The staff noted that temperatures were high in this location. The licensee stated that operators will not remain in the area except to position the PORV, then they will leave the room and contact the control room for further instructions. The licensee stated that they would perform an evaluation to verify that operators can safely operate the PORVs during an ELAP and if necessary, the blow-out panels in the room could be removed to reduce the temperature.

4.0 Exit Meeting (June 19, 2014)

The NRC staff audit team conducted an exit meeting with licensee staff following the closure of onsite audit activities. The NRC staff highlighted items reviewed and noted that the results of the onsite audit trip will be documented in this report. The following open items were discussed at the exit meeting (see Attachment 3 for additional information):

- a. ISE OI 3.2.4.7.A, Water Sources
The licensee's strategy to have an immediate source of water for the TDAFW pump is to demonstrate the ability of the CSTs to survive external hazards such as tornado-borne missiles. Note that following the audit, the licensee completed its analyses to credit the survival of the lower two-thirds of the CSTs. The analyses were posted on the eportal and reviewed by the NRC staff. These analyses demonstrate that the lower two-thirds of the CST are capable of surviving tornado-borne missiles and this item is now closed.
- b. ISE OI 3.2.4.10.B, Battery Duty Cycle
The licensee is seeking to extend battery life to 12 hours using load shed procedures. The NRC needs to review battery data that demonstrates satisfactory performance over this long period of time.
- c. ISE CI 3.1.1.2.A, Deployment of FLEX Equipment
The licensee needs to demonstrate that the deployment path from staging area B to staging area A will not be adversely affected by effects such as soil liquefaction in a seismic event.
- d. ISE CI 3.1.1.3.A, Procedural Interface Considerations
The FLEX Support Guidelines (FSGs) need to provide operators with instructions on establishing alternate monitoring and control capabilities. These FSGs were under development and not available for NRC review. Note that following the audit, procedure FSG-711 was posted on the eportal, and this item is now closed.
- e. ISE CI 3.2.1.6.A, Sequence of Events (SOE) Timeline
This is related to OI 3.2.4.7.A in that it is verifying a source of water is available to the TDAFW pump in time to prevent core damage. As discussed above in ISE OI 3.2.4.7.A, the licensee demonstrated by analyses that the lower two-thirds of the CSTs are capable of surviving tornado-borne missiles. Thus, the CSTs have

a sufficient water supply available for suction to the TDAFW pumps at Units 1 and 2 until Phase 2 FLEX equipment is deployed. This item is now closed.

- f. ISE CI 3.2.1.7.A, Cold Shutdown and Refueling
The licensee stated they would follow NEI's position paper and the NRC endorsement letter (ADAMS Accession No. ML13267A382). This requires, among others, that the licensee revise the shutdown risk process and procedures to incorporate use of the FLEX equipment. The revision of these procedures was not yet available for NRC review.
- g. ISE CI 3.2.4.4.A, Communications
This is to confirm upgrades to the site communications systems as stated in a CNP letter dated February 13, 2013 (ADAMS Accession No. ML13071A347). Some upgrades have been completed, but some are still in progress. For example, the Emergency Offsite Facility does not yet have the uninterruptible power supply (it is scheduled to be installed by September 30, 2014).
- h. ISE CI 3.2.4.9.A, Fuel Consumption Data
The licensee should have procedures which direct the refueling of the portable diesel-powered equipment at appropriate intervals from onsite fuel supplies, and provide direction for obtaining fuel from offsite before the onsite supplies are used up.
- i. ISE 3.2.4.10.A, DC Load Shedding
The licensee is revising the procedures for DC load shedding in order to shed additional loads. The NRC will review the final analyses and procedures.
- j. AQ 36, Room Conditions for Personnel Habitability and Equipment Functionality
The licensee was still working on room analyses, which will result in some specific operator actions to be placed in FSG-5. The NRC will review the final analyses and procedural actions.
- k. AQ 53, Personnel Habitability for Operation of Steam Generator (SG) Power-Operated Relief Valves (PORVs)
The licensee is developing an analysis of habitability requirements for the local operation of the SG PORVs. The NRC will review the final analysis.
- l. SRAI 14, Electromagnetic Compatibility (EMC)
The documentation for the spent fuel pool level instruments indicate some susceptibility to electromagnetic interference (EMI), which may result in invalid level indication. The documentation indicates that the level indication returns to normal when the EMI is removed. The licensee intends to add procedure notes to advise operators of this situation and to remove EMI, such as keying of radios, when taking level readings.

- m. SE #2, Resolution of Westinghouse Nuclear Safety Advisory Letter (NSAL) 14-1 NSAL -14-1 indicates there may be higher leakage from the reactor coolant pump (RCP) seals during an extended loss of ac power (ELAP) than was previously analyzed. The license is working to resolve this issue. The NRC will review the final resolution.
- n. SE #5, Accuracy of the NOTRUMP Computer Code
Westinghouse used the NOTRUMP computer code to develop certain timelines for operator actions in an ELAP event (see WCAP-17601-P for example). NRC simulations using the TRACE code indicate some differences, which may be significant enough to affect the timeline for operator actions. The pressurized-water reactor owner's group (PWROG) is working with the NRC on a resolution, which may be applicable to all PWRs.
- o. SE #8, Validation and Verification
The licensee was developing procedures for validation and verification of the revised plant procedures and the new FSGs, which are different from the NEI guidance in this area. The NRC will review those procedures.

CONCLUSION

The NRC staff completed all three parts of the May 21, 2014, onsite audit plan. Each audit item listed in Part 2 of the plan was reviewed by NRC staff members while on site. In addition to the list of NRC and licensee onsite audit staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion.

In support of the continuing audit process as the licensee proceeds towards orders compliance for this site, Attachment 3 provides the status of all open audit review items that the NRC staff is evaluating in anticipation of issuance of a combined safety evaluation for both the Mitigation Strategies and Spent Fuel Pool Level Instrumentation orders. The five sources for the audit items referenced below are as follows:

- a. Interim Staff Evaluation (ISE) Open Items (OIs) and Confirmatory Items (CIs)
- b. Audit Questions (AQs)
- c. Licensee-identified Overall Integrated Plan (OIP) Open Items (OIs)
- d. Spent Fuel Pool Level Instrumentation (SFPLI) Requests for Additional Information (RAIs)
- e. Additional Safety Evaluation (SE) needed information

The attachments provide audit information as follows:

- a. Attachment 1: List of NRC staff and licensee staff audit participants
- b. Attachment 2: List of documents reviewed during the onsite audit

- c. Attachment 3: CNP MS/SFPI SE Audit Items currently under NRC staff review (licensee input needed as noted)

While this report notes the completion of the onsite portion of the audit per the audit plan dated May 21, 2014, the ongoing audit process continues as per the letters dated August 28, 2013 and March 26, 2014, to all licensees and construction permit holders for both orders.

Additionally, while Attachment 3 provides a list of currently open items, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:

1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. MS/SFPI Audit Items currently under NRC staff review

Onsite Audit Participants

NRC Staff:

Stephen Vaughn	NRR/DIRS/IPAB
John Boska	NRR/MSD/MSPB
Joshua Miller	NRR/MSD/MRSB
Kerby Scales	NRR/MSD/MSEB
Stewart Bailey	NRR/MSD/MSEB

On Yee	NRR/MSD/MSEB
Stephen Wyman	NRR/MSD/MSEB

CNP Staff:

Michael H. Carlson	Director - Nuclear Technical Projects
John R. Anderson	Manager of Fukushima Response
Braddock D. Lewis	Senior Shift Technical Advisor
Allen D. James	Project Manager – Nuclear
Scott R. Wiederwax	Senior Fire Protection Technician
Danielle M. Burgoyne	Licensing Activity Coordinator
Gary W. Payton	Senior Engineer
Leroy J. Bush	FLEX Portfolio Manager – Contract
Keith M. Hernandez	Mechanical Engineer - Contract

Documents Reviewed

- Document No. 32-9222496-002 – DC Cook CST Missile Impact Analysis with LS-DYNA
- Document No. 32-9222624-004 – DC Cook FLEX CST - Missile Impact Analysis
- Document No. 51-9222950-000 – Donald C. Cook CST Availability Project – Tornado and Intervening Structures Assessment
- Draft calculation 12-E-S-250D-FLEX-001, Extension of Battery Life
- Calculation 13Q3208-CAL-003 R.0, Soil Liquefaction Analysis From FLEX Storage Building to Staging Area A
- Drawing No. – A1 and A2 – General Arrangement For Custom Tornado Door, FLEX Storage Building, Cook Nuclear Power Plant
- Drawing No. – EE003 – Electric Details, FLEX Storage Building, Cook Nuclear Power Plant
- FLEX Storage Building structural calculation 13314-2
- Westinghouse letter LTR-FSE-13-66, Response to NRC Audit Question 16, dated November 1, 2013
- Draft SAFER Response Plan for CNP
- ELAP ECA-0.0 (1-OHP-4023), Loss of All AC Power
- 1-OHP-4027-FSG-1, Long Term RCS Inventory Control
- 1-OHP-4027-FSG-2, Alternate AFW Suction Source
- 1-OHP-4027-FSG-3, Alternate Low Pressure Feedwater
- 1-OHP-4027-FSG-4, ELAP Power Management
- 1-OHP-4027-FSG-5, Initial Assessment and FLEX Equipment Staging
- 1-OHP-4027-FSG-6, Alternate CST Makeup
- 1-OHP-4027-FSG-7, Loss of Vital Instrumentation or Control Power
- 1-OHP-4027-FSG-8, Alternate RCS Boration
- 1-OHP-4027-FSG-9, Low Decay Heat Temperature Control
- 1-OHP-4027-FSG-10, Passive RCS Injection Isolation
- 1-OHP-4027-FSG-11, Alternate SFP Makeup and Cooling
- 1-OHP-4027-FSG-12, Alternate Containment Cooling
- 1-OHP-4027-FSG-13, Alternate RHR Cooling
- 12-OHP-4027-FSG-311, FLEX Lift Pump Operation
- 12-OHP-4027-FSG-312, FLEX Booster Pump Operation
- 1-OHP-4027-FSG-401, ELAP Power Management Equipment Deployment
- 12-OHP-4027-FSG-511, FLEX Equipment Refueling Operation
- 1-OHP-4027-FSG-1101, Alternate Spent Fuel Pool Makeup Equipment Deployment
- Document No. 32-9208453-000 (CNP Doc No – MD-12-FLOOD-006-N Rev.0) “Surge and Seiche, Cook Nuclear Plant Flood Hazard Re-Evaluation
- Design Basis Document for the Auxiliary Feedwater System – DB-12-AFWS, Rev. 5.
- PMP-4030-001-001, Rev. 15 – Impact of Safety Related Ventilation on the Operability of Technical Specification Equipment – Turbine Driven Auxiliary Feedpump Rooms Ventilation

- Battery room hydrogen concentration – calculation MD-12-HV-013-N and MD-12-HV-022-N
- Battery room ventilation - calculations: MD-12-HV-026-N, MD-12-HV-029-N
- Electrical Calculations: FLEX-1-EL-01, FLEX-1-EL-02, FLEX-1-EL-03, FLEX-1-EL-04
- Electrical Drawings: OP-1-12002-67, CS-1-93632-1, OP-1-12001-84, OP-1-12015-36, OP-1-12050-26, OP-1-98099-5
- Spent Fuel Pool Level Instrumentation calculations MD-12-SFP-002-N, RD-13-03, NAI-1791-001, NAI-1725-004
- MD-12-FLEX-001-S, “DC Cook FLEX – RCS Makeup Hydraulic Analysis”
- MD-12-FLEX-002-S, “DC Cook FLEX – Core Cooling and Makeup Hydraulic Analysis” (this included SFP makeup)
- Westinghouse letter LTR-FSE-13-69, Rev. 0, Analysis of Need for Heat Tracing or Ice Removal

DC Cook
Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:
Audit Items Currently Under NRC Staff Review, Requiring Licensee Input As Noted

Audit Item Reference	Item Description	Licensee Input Needed
ISE OI 3.2.4.10.B	Battery Duty Cycle - The licensee is seeking to extend battery life to 12 hours using load shed procedures. The NRC needs to review battery data that demonstrates satisfactory performance over this long period of time.	CNP has not adopted the NEI position paper on extended battery duty cycles and NRC endorsement (ADAMS Accession No. ML13241A188). Provide battery data.
ISE CI 3.1.1.2.A	Deployment of FLEX Equipment - The licensee needs to demonstrate that the deployment path from staging area B to staging area A will not be adversely affected by effects such as soil liquefaction in a seismic event.	Provide liquefaction study.
ISE CI 3.2.1.1.A	Computer Code – Show that use of the NOTRUMP code for the ELAP analysis of Westinghouse plants is limited to the flow conditions prior to reflux condensation initiation. This includes specifying an acceptable definition for reflux condensation cooling.	Similar to SE #5 below, see discussion there.
ISE CI 3.2.1.2.A	Reactor Coolant Pump Seals - Confirm applicable analysis and relevant seal leakage testing data, which justifies that (1) the integrity of the associated O-rings will be maintained at the temperature conditions experienced during the ELAP event, and (2) the seal leakage rate of 21 gpm/seal used in the ELAP is adequate and acceptable.	Verify that the installed RCP seal leakoff flow rotameters have enough resistance to flow to continue to use 21 gpm for seal leakage in an ELAP.

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.2.1.2.B	Reactor Coolant Pump Seals - The low-leakage seals are not currently credited in the FLEX strategies. Testing and qualification of SHIELD is ongoing. I&M is closely following the re-design of SHIELD and will modify analyses and FLEX strategies, as needed, based on the conclusions of the SHIELD modification program. Confirm FLEX strategies are appropriately modified if low-leakage seals are credited.	Confirm which RCP seal leakage model will be used, and show its validity.
ISE CI 3.2.1.3.A	Decay Heat - Confirm the input parameters used to develop the decay heat model.	None. CNP response is under review.
ISE CI 3.2.1.4.A	Parameters and Assumptions -Confirm that the important plant parameters and assumptions used in the final site-specific analyses reflect the final FLEX support guidelines.	None. CNP response is under review.
ISE CI 3.2.1.6.B	SOE Timeline - Confirm that the revised SOE timeline reflects the change in strategy of not taking credit for low leakage seals and the new site specific boration analysis.	None. CNP response is under review.
ISE CI 3.2.1.7.A	Cold Shutdown and Refueling - The licensee stated that they would follow NEI's position paper and the NRC endorsement letter (ADAMS Accession No. ML13267A382). This requires, among others, that the licensee revise the shutdown risk process and procedures to incorporate use of the FLEX equipment. The revision of these procedures was not yet available for NRC review.	Shutdown risk process and procedures which incorporate use of the FLEX equipment.

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.2.4.4.A	Communications - This is to confirm upgrades to the site communications systems as stated in a CNP letter dated February 13, 2013 (ADAMS Accession No. ML13071A347). Some upgrades have been completed, but some are still in progress. For example, the Emergency Offsite Facility does not yet have the uninterruptible power supply (it is scheduled to be installed by September 30, 2014).	Complete remaining communications upgrades.
ISE CI 3.2.4.6.A	Personnel Habitability - Confirm that FLEX guideline validation process will address personnel accessibility and habitability concerns based on site-specific evaluations.	See SE #8 below for necessary resolution.
ISE CI 3.2.4.9.A	Fuel Consumption Data - The licensee should have procedures which direct the refueling of the portable diesel-powered equipment at appropriate intervals from onsite fuel supplies, and provide direction for obtaining fuel from offsite before the onsite supplies are used up.	Provide overall refueling strategy.
ISE CI 3.2.4.10.A	DC Load Shedding - The licensee is revising the procedures for DC load shedding in order to shed additional loads. The NRC will review the final analyses and procedures.	Analyses and procedures for DC load shedding.
AQ 11	Review of the licensee's plan regarding the use of the thermal hydraulic analyses contained in WCAP 17601 for identifying the time constraints associated with implementing the FLEX strategies does not contain sufficient information to provide reasonable assurance that the licensee's plan will conform to the guidance in NEI 12-06 sections 1.3 and 3.2.1.7 because no detailed comparison of the CNP plant specific parameters with the parameters used in NOTRUMP analysis in WCAP 17601-P has been provided.	None. CNP response is under review.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 14	The licensee's plan regarding SOE of the ELAP analysis does not contain sufficient information to provide reasonable assurance that the plan conforms to NEI 12-06 section 3.2.1.7 (6) because a) SOE indicates no time constraint for completing the boration and b) no technical basis for sizing the flow rate for the FLEX boric acid injection pump was provided. The licensee is requested to provide the timeline which results in adequate boration to prevent recriticality and to provide the basis for sizing the boric acid injection flow rate.	None. CNP response is under review.
AQ 28	The licensees' plans for equipment maintenance and testing which endorses the EPRI industry program for maintenance which is currently under development does not provide reasonable assurance that guidance and strategies developed and implemented under them will conform to the guidance of NEI 12-06, Section 11.5 with respect to maintenance and testing. Please provide details of the EPRI industry program for maintenance and testing of FLEX electrical equipment such as batteries, cables, and diesel generators.	None. CNP response is under review.
AQ 36	Room Conditions for Personnel Habitability and Equipment Functionality - The licensee was still working on room analyses, which will result in some specific operator actions to be placed in FSG-5. The NRC will review the final analyses and procedural actions.	Room analyses for personnel habitability and equipment functionality.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 42	The licensee's strategy includes plans to make up to the steam generators through the normal feedwater system with raw water. Will there be strainers for the raw water sufficient to remove debris which might impede flow through the feedwater ring nozzles (J nozzles) in the steam generators?	Need to see calculation CN-SEE-13-7 and Westinghouse Calculation CN_SEE=II-13-16, Revision 0-A.
AQ 48	The equipment listed in the OIP for Phase 2 shows two high pressure FLEX electrically driven pumps rated at 10 gpm which are used for boration of the RCS. Provide the justification that only two pumps meet the intent of the N+1 criterion.	Licensee stated they will have 3 high pressure boric acid FLEX pumps and 3 FLEX generators to power the pumps (confirm in August 2014 6 month update).
AQ 53	Personnel Habitability for Operation of Steam Generator (SG) Power Operated Relief Valves (PORVs) - The licensee is developing an analysis of habitability requirements for the local operation of the SG PORVs. The NRC will review the final analysis.	Provide engineering evaluation to demonstrate that personnel can safely access the Steam Stop Enclosures and locally operate the SG PORVs.
SE #1	RCS venting in support of mitigating strategies for RCS makeup and boration.	The generic FSG-8 issued by the PWROG states that the vessel head vent should be used before using the pressurizer PORV, but the CNP FSG-8 switches the order. As the vessel head vents were designed to be used in this type of situation, justify this deviation from the generic guidelines. Also, ECA-0.0 does not appear to require injection of water into the RCS prior to reaching reflux cooling. The intent is to avoid reflux cooling if possible.

Audit Item Reference	Item Description	Licensee Input Needed
SE #2	Resolution of Westinghouse Nuclear Safety Advisory Letter (NSAL) 14-1 - NSAL -14-1 indicates there may be higher leakage from the reactor coolant pump (RCP) seals during an extended loss of ac power (ELAP) than was previously analyzed. The license is working to resolve this issue. The NRC will review the final resolution.	Resolution of NSAL 14-1. See also CI 3.2.1.2.A.
SE #5	Accuracy of the NOTRUMP Computer Code - Westinghouse used the NOTRUMP computer code to develop certain timelines for operator actions in an ELAP event (see WCAP-17601-P for example). NRC simulations using the TRACE code indicate some differences, which may be significant enough to affect the timeline for operator actions. The pressurized-water reactor owner's group (PWROG) is working with the NRC on a resolution, which may be applicable to all PWRs.	PWROG project PA-ASC-1274 should provide resolution on the accuracy of the NOTRUMP code and the ability to predict the time that reflux cooling starts.
SE #8	Validation and Verification - The licensee was developing procedures for validation and verification of the revised plant procedures and the new FSGs, which are different from the NEI guidance in this area. The NRC will review those procedures.	Validation and verification procedures which also address human factors concerns.

L. Weber

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If you have any questions, please contact me at 301-415-2901 or by e-mail at John.Boska@nrc.gov.

Sincerely,

/RA/

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Office of Nuclear Reactor Regulation

Docket Nos.: 50-315 and 50-316

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